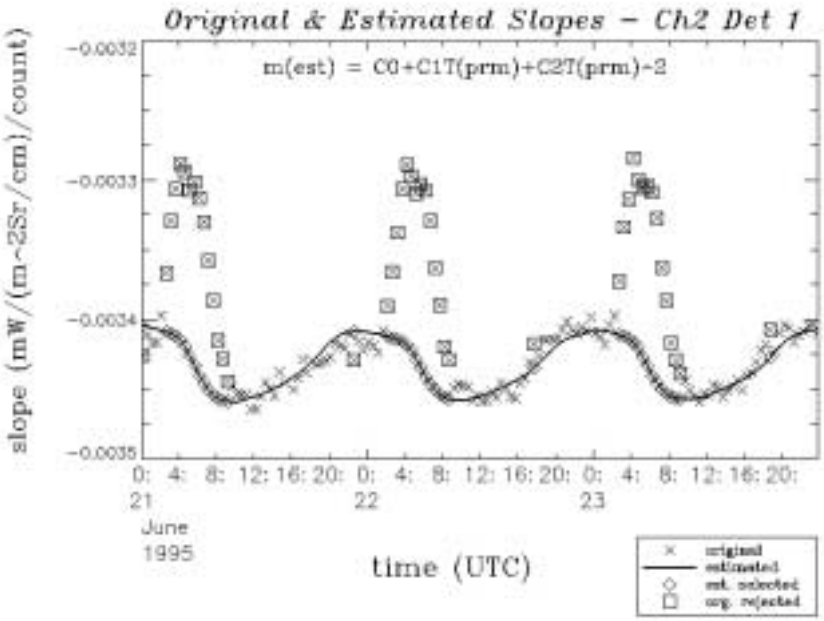
CORRECTION FOR GOES IMAGER MIDNIGHT CALIBRATION ERRORS

NOAA/NESDIS proposes to make a change (early second quarter of CY 2003) in the calibration of the GOES-8 and -10 Imagers to correct for the deleterious effects of solar heating on the calibration during the 8 hours surrounding local midnight (0500 UT for GOES-8, 0900 UT for GOES-10). Data users may notice changes in measured radiances that will reach a maximum of approximately 1K (for a scene at 300K) within an hour of midnight and will decrease with increasing time away from midnight. A more detailed description of the midnight calibration errors and the proposed correction algorithm follows.

Calibration slopes computed from on-orbit calibration data in the infrared channels of the GOES-8 and -10 Imager can be in error by as much as 3% during the period around local satellite midnight. The effect is most pronounced in channels 2 and 3 (3.9 and 6.7 μm, respectively) of the Imager, but it is also noticed to a lesser extent in channels 4 and 5 (10.7 and 12.0 μm, respectively). For GOES-10, the effect occurs almost year-round, but for GOES-8 it occurs primarily from April through October. An example of the effect is shown as the upward spikes in the time series of calibration slopes displayed in the figure below. Such slope errors artificially depress measurements of brightness temperature of the Earth by as much as 1K. This effect is believed to be caused by extraneous radiation, probably from hot components in the Imager's scan-mirror cavity, reaching the Imager's detectors during its calibration cycle.

The correction algorithm is based on the observation that when this effect is absent, there is a very high correlation between the calibration slope and the temperature of several optics components, particularly the telescope's primary mirror. Accordingly, when the effect occurs, we replace the bad slope values by estimates computed by regression on the primary-mirror temperature. The figure shows the original slopes that have been replaced (x's inside squares) by the regression estimates (solid line), which we believe are better estimates of the instrument's true slopes.

For more information, see Johnson, R.X. and M.P. Weinreb, GOES-8 Imager Midnight Effects and Slope Correction, in *GOES-8 and Beyond*, Edward R. Washwell, editor, Proc. SPIE **2812**, pp 596-607 (1994).



Original and estimated slope values for channel 2 of GOES-8 imager.